but is very sluggish, broad, more or less flattened, and, in fact, when full grown, looks like a small brown scale.

The larvæ of Lepidoptera are familiar to us all, under the name of caterpillars. The insects of this order in their larval condition are almost all phytophagous, and are very uniform both in structure and habits. The body is long and cylindrical, consisting of thirteen segments ; the head is armed with powerful jaws ; the three following segments, the future prothorax, mesothorax, and metathorax, bear three pairs of simple articulated legs. Of the posterior segments, five also bear false or pro-legs, which are short, unjointed, and provided with a number of hooklets. A caterpillar leads a dull and uneventful life ; it eats ravenously, and grows rapidly, casting its skin several times during the process, which generally lasts only a few weeks, though in some cases, as for instance the goat-moth, it extends over a period of two or three years, after which the larva changes into a quiescent pupa or chrysalis.

JOHN LUBBOCK

(*To be continued.*)

ON THE STRUCTURE OF STRIPED MUSCULAR FIBRE

A HIGHLY interesting paper on the above subject was read before the Royal Society on April 3, by Mr. E. A. Schäfer, of University College. The muscle of the limbs of the large water-beetle formed the subject of the investigation, and it was examined immediately after removal from the living animal, without the addition of any reagent, to prevent the introduction of complications. According to the author, a muscular fibre consists of a homogeneous ground substance, which appears at first sight to be formed of two distinct substances, one dim and the other bright, arranged in alternate discs at right angles to the direction of the fibre ; and a vast number of minute rod-like bodies, imbedded in the protoplasmic basis, having their axes coincident with that of the fibre itself. These are termed *muscle-rods* ; in the muscle at absolute rest they are uniformly cylindrical, and produce the appearance of a simple longitudinal fibrillation in the fibre, with no transverse striping. But when in action these muscle-rods are terminated at each extremity by a knob, and are consequently dumb-bell shaped. It is these knobs which give the appearance of the line of dots which is always described as existing in the middle of each bright transverse band of the muscle fibre, whereas the dim one is that in which the shafts of the muscle-rods are imbedded. In contraction of the muscle, the heads of the rods become enlarged at the expense of the shafts, the extremities of each muscle-rod consequently approaching one another ; and the enlarged heads come nearer to their neighbours of the same series, and to those of the next series which meet them in the bright stripe, the line of dots now appearing as a dark transverse band with bright borders. As contraction proceeds the shaft of the muscle-rod tends to, and ultimately disappears, leaving an appearance of alternate dark and light stripes ; the former however are in this case due to the enlarged juxtaposed extremities of the rods, the latter on the other hand being mainly due to the accumulation of the ground-substance in the intervals between their shafts. An examination of minute oil-globules imbedded in gelatine shows clearly that they give the appearance under the microscope of dark spots with a brilliant surrounding, and several side by side produce the effect of a bright band. From many considerations it can be shown that the bright transverse bands in muscle are similarly produced by the juxtaposition of the rod-heads, among which are the following :—1. When the rod-heads are smaller the bright bands are narrower. 2. When the rod-heads have become merged with the shafts in full contraction, the bright transverse stripes entirely disappear. 3. When in contraction the rod-heads enlarge and encroach on the shaft, their bright borders accompany them and encroach on the dim substance, so that at last all appearance of dimness becomes entirely obliterated, the bright borders becoming blended in the middle. 4. The part of the muscle-rod where the head joins the shaft, is rendered indistinct by the brightness around the rod-head ; whereas if this brightness were inherent in the ground substance, this part of the rod would stand out all the darker by the contrast. 5. The appearance of a transverse section is corroborated ; for in this case the rod-heads are seen so close together that the optical effect of any one would become merged into those of its neighbours : consequently the whole of the intermediate substance would appear bright ; and this is actually found to be the case. 6. The fact that both the dim and the bright substance of resting muscle appear doubly refracting, would indicate that they are of the same nature.

Mr. Schäfer with polarised light has found that *all* the ground-substance of the fibre is doubly refractive, the rods alone being singly refractive. He concludes the paper by offering a conjecture as to the mode of muscular contraction, in which he is inclined to regard the ground-substance as the true contractile part, and the rods as elastic structures, merely serving to restore the fibre to its original length.

NOTES

A RUMOUR as to the fate of Sir Samuel and Lady Baker, of a kind similar to those which have ever and anon filled the air with reference to the undying Livingstone, appeared in the *Times* of Thursday last. At the end of last year, with his force dwindled down to 200 men, Sir Samuel had penetrated south until he had reached the territory of the chief of the tribes squatting near the great lakes, who had hitherto been friendly to the Egyptian government. His reception of Baker and his companions was however the reverse of friendly. Whatever the cause, a desperate conflict with the natives ensued, and after much hard fighting, Baker was compelled to retreat with but 30 out of his 200 men. It was with the utmost difficulty that the survivors succeeded in intrenching themselves in a small fort, whence to beat back further attacks. Such, according to report, was the state of matters at the end of last year. The present rumour is that Sir Samuel and Lady Baker having at last been compelled to surrender, were immediately afterwards murdered. A telegram from H.M. Consul at Alexandria, dated the afternoon of last Thursday, announces that no intelligence of any sort respecting Sir Samuel and Lady Baker had been received by the Egyptian Government, or by any other, since March 5 last. A telegram of April 19, from the Alexandria *Daily News* Correspondent states that the rumour seems to be utterly unfounded. We have, moreover, been assured by one who has the best opportunities of knowing, that no news has really been received, and that the reports about Sir Samuel are inventions : "there is not," he writes us, "a word of truth in them."

WE regret to announce that Baron Liebig's illness, to which we referred last week, has terminated in death. The great chemist died on the 18th instant, aged nearly 70 years, having been born at Darmstadt on May 12, 1803. His funeral took place with great ceremony at Munich on the 21st. We hope, in an early number, to be able to give a memoir of the late Baron.

IT is with the greatest regret that we announce the death, on the 20th inst., after a long, and latterly, severe illness, of Dr. Bence Jones, Secretary to the Royal Institution, the efficiency of which he has done much to promote. Dr. Jones was a distinguished chemist, and among his contributions to the advancement of science may be mentioned his Croonian Lectures on Matter and Force, Animal Chemistry in relation to Stomach and

Renal Diseases, Lectures on Pathology and Therapeutics, &c. His reputation has been latterly much extended by his work on the early history of the Institution, and by his excellent biography of Faraday. Dr. Jones was a member of many learned and scientific societies, at home and abroad. It will not be easy for the managers of the Royal Institution to find one capable of so efficiently discharging the duties of Secretary. Our readers will remember that a short time ago a movement was set on foot to get up a well-deserved testimonial to Dr. Jones, which, in agreement with his own wishes, is to take the form of a bust to be placed in the Royal Institution.

Dr. F. Arnold Lees and Mr. T. B. Blow propose to form a club under the name of the Botanical Locality Record Club, the object of which shall be to collect and keep a record of the exact localities of all the rarer British plants, with the dates of the latest observance of each, to be published yearly at the end of each season. The yearly report, containing not only a detailed list of the localities, but also a geographical summary of each year's work, is to be published and distributed only to members of the club, and to certain learned societies; to the former a subscription of 5*s.* will be charged. The names of botanists desiring to become members are to be forwarded to Mr. T. B. Blow, Welwyn, Hertfordshire.

Mr. N. Holmes, Curator of the Museum of the Pharmaceutical Society, has been appointed Lecturer on Botany to the Westminster Hospital, in the place of Mr. A. W. Bennett.

Dr. Acland, the Regius Professor of Medicine in the University of Oxford, has given notice that the following gentlemen have been appointed to Radcliffe Studentships for the ensuing Term: Mr. A. W. Harding, of University College Hospital; Mr. Joseph H. Philpot, of King's College Hospital; Mr. William Garton, of St. Thomas's Hospital; and Mr. Frederick W. Jordan, of the Manchester Infirmary.

Among the works recommended by the Board of Studies in Natural Science of the University of Oxford to students preparing for examination at the University, is Sachs's "Lehrbuch der Botanik." For the benefit of those unacquainted with the German language, the Delegates of the Clarendon Press have arranged with Prof. Sachs and with MM. Engelmann, of Leipzig, for an English translation of this work from the third edition, just published in Germany, and containing a large amount of additional matter; the whole of the 460 woodcuts with which the original work is illustrated will be reproduced in the English edition. The translation has been entrusted to Mr. A. W. Bennett, who will also annotate the work on points where sufficient prominence does not appear to be given to recent researches, or undue prominence seems to be asssigned to certain theories, in which part of the labour he will be assisted by Prof. Thiselton Dyer. The work is expected to be ready by about the end of the year.

The Edinburgh Botanical Society offers a prize of ten guineas for the best and approved essay on the Reproduction of Lycopodiaceæ, to be competed for by students who have attended the botanical class of the Royal Botanic Garden, Edinburgh, during at least one of the three years preceding the award, and have gained honours in the class examinations. The author is expected to give results of practical observations and experiments made by himself on the subject, illustrated by microscopical specimens. The essay and specimens to be given in on or before May 1, 1876, with a sealed note containing the author's name, and a motto outside. Facilities will be given for carrying on observations and experiments at the Royal Botanic Garden, Edinburgh. A prize of ten guineas is offered, through the Council of the Botanical Society, by Charles Jenner, Esq., for the best and approved essay on the Structure and Reproduction of the Frondose and Foliaceous Jungermanniaceæ. This prize is subject to all the conditions specified in the case of the former.

Mr. Charles B. Plowright, of the Hospital, King's Lynn, proposes issuing, under the title of "Sphæriacei Britannici," a few sets, each containing one hundred specimens, intended to form a fair representation of the more important genera and species of the British Sphæriacei. The price will be 1*l.*

The soirée of the Royal Society is to take place at Burlington House on Saturday evening next, the 26th inst.

We regret to announce the death of Sir William Tite, M.P., at Torquay, on Sunday.

We regret to hear of the serious illness of the Rev. George Henslow from a paralytic seizure, which has impaired the use of the lower limbs, but has not in any way affected his mental faculties, or the use of his arms. We understand that he has appointed Dr. B. T. Lowne to take his place for the present season as lecturer on Botany at Bartholomew's Hospital.

In pursuance of the recommendation of a committee appointed at a former meeting, a conference, presided over by theRev. H. Solly, took place on Saturday evening in further promotion of the movement for giving some of the advantages of University education to working men. The idea is to form a Guild of Operative tradesmen to arrange for the delivery of lectures in various places by lecturers provided by and sent from the University of Cambridge. Mr. Solly stated what had been done since last meeting. The Council of Trades' Delegates had passed a resolution expressing great satisfaction with the progress of the proposed scheme, while in the interviews which the chairman had had with the heads of the University every encouragement had been afforded to the project, provided that a firm organisation could be secured to deal with. The following resolution was passed:—"That, in the present defective state of technical and higher education for the workman, no adequate provision being made for those objects, either by the State or by private endeavour, this meeting hails with satisfaction the proposal to form a Trades' Guild of Learning to co-operate with the University of Cambridge and other parties willing to aid in the education of the people."

Frederich Dautwitz writes us that he will exhibit a collection of *Cactaceæ* at the Lustschloss, Schönbrunn, Vienna, where he will be glad to receive visitors. He is also desirous of effecting exchanges.

The sum which was left as the proceeds of Prof. Tyndall's lectures in America, after paying expenses, was 13,000 dols. This balance has been placed in charge of a committee consisting of Prof. Henry, General Hector Tyndale (Prof. Tyndall's cousin), in Philadelphia, and Prof. Youmans, of New York, and these gentlemen are authorised to expend it in aid of students who devote themselves to original investigation. A suggestion has been made, and one worthy of encouragement, that efforts be initiated to secure an increase of this fund to at least 50,000 dols., the whole to bear the name of the Tyndall Fund, so that the objects of the professor may be carried out to a fuller extent.

Science is certainly in the ascendant in America at present. A fortnight ago we noted the princely gift of Mr. Anderson to Prof. Agassiz. The California Academy of Sciences has recently received from Mr. James Lick a magnificent gift of a building site in the city of San Francisco, valued at about 100,000 dollars.

For the purpose of more fully carrying out the law of Congress in reference to the propagation of useful food fishes in the rivers and lakes of the United States, the United States Commissioner of Fish and Fisheries made arrangements with Mr. N. W. Clark to hatch out several hundred thousand white fish eggs at his establishment at Clarkston, Michigan, with the special object of transferring them, in due season, to the waters of California. At the proper time, in February last, two hundred thousand eggs were carefully packed and forwarded to California; but, for some unexplained reason, they were nearly all dead on their arrival. In no way discouraged by this experience, the Commissioner directed the shipment of a second lot of two hundred thousand eggs, which arrived in good condition, and the greater number have since hatched out at the State hatching establishment at Clear Lake, into which body of water they will be put at the right time. The feasibility of shipping the eggs of white fish over so great a distance has now been satisfactorily solved, and there will probably be no difficulty in carrying on this work to any desirable extent. Mr. Stone has returned to the East with the view of procuring living black bass, eels, perch, and lobsters, which he will take back to California in a few weeks, in a special car arranged expressly for the purpose. The California Commissioners appear to be fully alive to the interests involved in the multiplication of the food-fishes in their State, and seem disposed to leave no method untried to accomplish this desirable object.

THE American Association for the Advancement of Science commences its twenty-second session at Portland, Maine, on Aug. 20.

THE Annual General Meeting of the Iron and Steel Institute will be held at Willis's Rooms, London, on April 29 and 30, and May 1.

PROF. O. C. MARSH has in the current number of the *American Journal of Science and Ars* done much to clear up the difficulties connected with the *Dinocerata*. He has had the opportunity of comparing his specimens with photographs of *Eobasileus* or *Loxolophodon cornutus* of Cope, for the first time, and finds that it is exactly the same as the species named by him (Marsh) *Tinoceras grandis* some time before the introduction of either of Prof. Cope's synonyms. Prof. Marsh says, "The species of *Dinocerata* at present known with certainty are the following:—*Tinoceras anceps* Marsh, *Tinoceras grandis* Marsh, *Uintatherium robustum* Leidy, *Dinoceras mirabilis* Marsh, *Dinoceras lacustris* Marsh." With regard to the osteology of the class, we are surprised to hear for the first time that in the foot the hallux is absent, and the astragalus articulates with the cuboid as well as the naviculare bone, features not Proboscidian at all.

IF we may judge from the "Register" of Lehigh University, South Bethlehem, Penns., U.S., that institution seems to be, in most respects, a model one. It was founded only a few years ago, and is the result of a magnificent gift of 500,000 dollars and 56 acres of ground, beautifully situated in the Lehigh Valley, South Bethlehem, by the Hon. Asa Packer. South Bethlehem is about fifty-four miles from Philadelphia. The education given by the staff of professors is free, the only expense to the student being his board, books, apparatus, &c. According to the plan of education laid down, the first three terms "are devoted, by all regular students, to the study of those elementary branches in which every young man should be instructed, for whatever profession or business in life he may be intended, viz., Mathematics, Languages, Elementary Physics, Chemistry, Drawing, History, Rhetoric, Logic, Declamation, and Composition." At the end of this preliminary period, by which time the Lehigh student will be not less than 17½ years old, he makes up his mind what particular direction his studies will take during the remaining five terms (2½ years) which complete the regular course. According as he decides, the student goes through the special course provided for one of the following subjects:—General Literature, Civil Engineering, Mechanical Engineering, Mining and Metallurgy, or Analytical Chemistry: three other departments have yet to be added to this special course. According to the prospectus before us, the training provided in each of the special courses is wise and thorough, and well calculated to put a diligent student in the way to make the furthest advances in the branch he adopts. Any student who wishes may pursue his studies at the University free for three years longer than the regular course. Latin and Greek are optional in all departments except that of Literature (which, by the bye, has a large infusion of physical science), while French and German are imperative in all. The institution is rendered complete by an excellent laboratory, a well-furnished observatory and a gymnasium.

PROF. PETERS has named the last two planets discovered by him, Nos. 129 and 130, Antigone and Electra.

AMONG Mr. Murray's list of forthcoming works are the following:—"The evil Effects of Interbreeding in the Vegetable Kingdom," by Charles Darwin, F.R.S.; Sir Charles Lyell's "Antiquity of Man," 4th edition; "England and Russia in the East," by Sir Henry Rawlinson, K.C.B., F.R.S.; "Human Longevity: its Facts and Fictions," by W. J. Thoms; "Personal Recollections from Early Life to Old Age," by Mary Somerville.

THE Perthshire Society of Natural Sciences has recently done a very proper thing. On the suggestion of the council, the Hon. Secretary was instructed to communicate with such members of the Society as might be elected to serve on the Perth School Board and other School Boards in Perthshire, and ask them to keep in view the importance of introducing into the course of instruction in schools the elements of natural science.

SOME time since a paragraph appeared in NATURE relating to a supposed power of a preparation of boxwood over the growth of the human hair. A correspondent would be glad if any of our readers could inform him in what way the preparation is made, and what part of the plant is used.

MR. F. W. PUTNAM has sent us a few archæological notes on an ancient fortification surrounded by a great number of mounds, at Merom and Hutsonsville, Sullivan Co., Ind., U.S. The fort is situated on a plateau of loess, about 170 feet above the Wabash, on the east bank of the river. The position of the fort would be one of great advantage even at the present day. One of the mounds outside was dug into, and at the bottom of the pit thus made were found remains of a fire, bones of animals, pottery, and an arrow head. Mr. Putnam concludes that the pits now filled up so as to form mounds, were the houses of the inhabitants or defenders of the fort.

THE additions to the Zoological Society's Gardens during the last week include an Ocelot (*Felis pardalis*), from Honduras, presented by Miss E. E. Brooks; two vinaceous Turtle Doves (*Turtur vinaceus*) from W. Africa, presented by T. P. Tindale; a Leopard (*Felis pardus*) and a Civet Cat (*Viverra civetta*) from W. Africa, presented by L. Hart; two Goldfinch (*Carduelis elegans*) and two Canary Finches (*Serinus canarius*) from Madeira, and a Paradise Whydah Bird (*Vidua paradisea*) from W. Africa, presented by Lieut. F. L. C. Hearne; a Philantomba Antelope (*Cephalopus maxwellii*), born in the Gardens; three Indian Tree Ducks (*Dendrocygna arcuata*); three Summer Ducks (*Aix sponsa*) from N. America; two Hooded Cranes (*Grus monachus*) from Japan, purchased; two Malayan Tapirs (*Tapirus indicus*), a Rhinoceros Hornbill (*Buceros rhinoceros*), from the Malay peninsula; a Derbian Wallaby (*Halmaturus derbianus*) from Australia; a Hoffmann's Sloth (*Cholopus hoffmanni*) from Panama; and a Greater Sulphur Crested Cockatoo (*Cacatua galerita*) from Australia, deposited.